FAT SHARK
RC VISION SYSTEMS

PREDATOR FPV GOGGLE

USER MANUAL

Revision B 05/09/2012

For more product information, please visit:
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Introduction

Congratulations on purchasing the Fat Shark Predator VGA FPV video goggles with integrated 5G8 wireless receiver and advanced M.I.G. (magnetic, inertial, gyro) head tracking technology. To ensure your continued enjoyment, please take the time to thoroughly read through this operating manual before using.

Product Compatibility

The Predator has been designed to adhere to established video standards and is compatible with any product also adhering to accepted video standards. Due to the high number of different manufacturers and variation in quality, it's impossible to for us to have tested with every product combination and some troubleshooting may be required if mix/matching components. The Predator has been thoroughly tested with ImmersionRC gear. For best results and no compatibility issues, Fat Shark recommends ImmersionRC gear for your accessory products.

IMPORTANT!!!! Product Warning!!!!!

DO NOT LEAVE HEADSET EXPOSED TO DIRECT SUNLIGHT. SUNLIGHT WILL MAGNIFY THROUGH THE OPTICS AND BURN HOLES IN THE LCD COLOR FILTER THIS WILL NOT BE COVERED BY WARRANTY. KEEP GOGGLES IN PROTECTIVE CASE WHEN NOT IN USE

Product contents

Carry case

Predator Headset

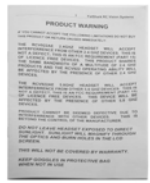
Data cable

AV cable

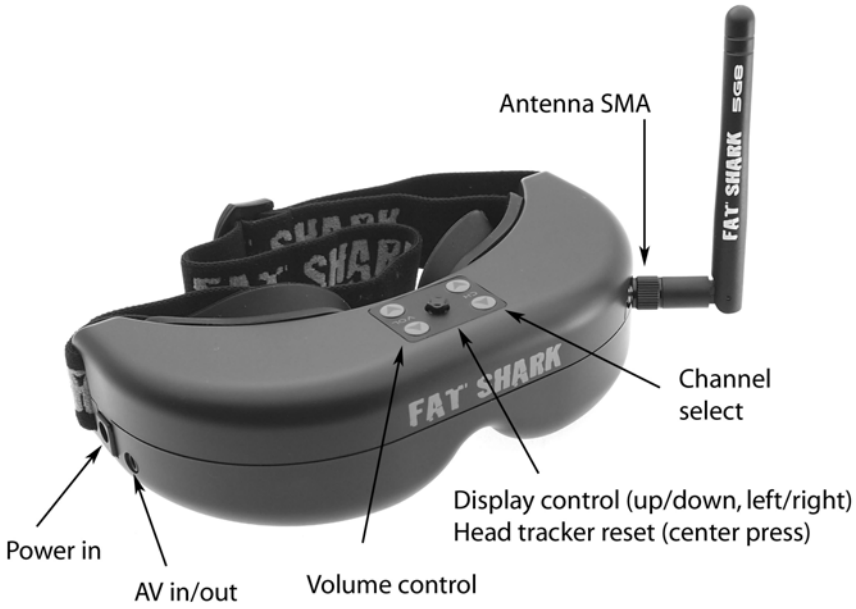
5G8 Antenna

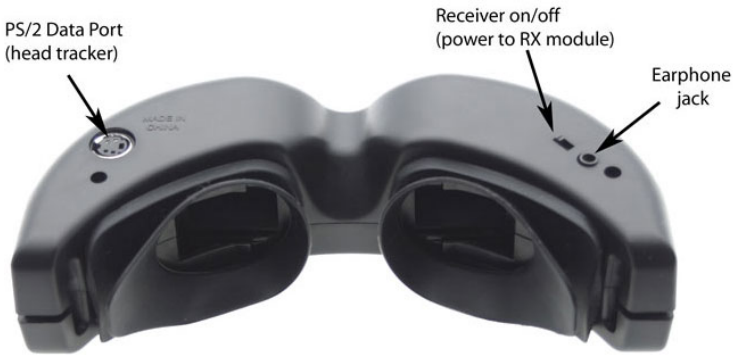
Battery
(with discharge adapter)

Manual



Controls Diagram





Controls

Brightness/contrast control: pressing left and right increases/decreases display contrast. Press forward/back increases/decreases brightness.

RX power switch: The receiver module power is controlled by this switch. If viewing video source via the AV cable; the RX module needs to be turned off to avoid image conflict.

Channel select: Pressing channel up/down buttons will cause the channel to incrementally increase/decrease. Audio beep sounds on channel change. A long beep sounds on channel top and bottom limits.

Note: Predator uses an Airwaves brand RF module. Fat Shark only guarantees compatibility with transmitters using Airwaves brand modules.

Predator is compatible with Fat Shark and ImmersionRC transmitters.

CH1: 5740 MHz CH2: 5760 MHz CH3: 5780 MHz CH4: 5800 Mhz
CH5: 5820 MHz CH6: 5840 Mhz CH7: 5860 MHz

Low battery warning: Audio warning if input voltage drops below 6.8V

Volume control: each press of button increments volume up or down. Standard earphones can be used with the Predator (not included).

Head tracker

Setup

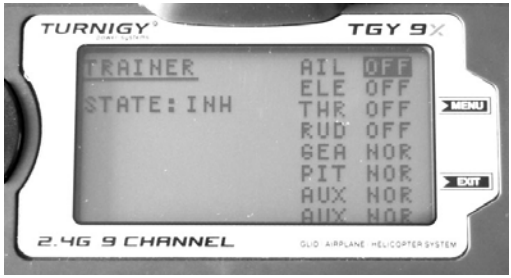
To enter the setup menu, hold down the head tracker button before applying power to the headset (release button immediately after powering). The head tracker will beep and enter menu mode and beep according to the following chart. Press the HT button a 2nd time during the pause after the menu choice beep code to select. Head tracker will automatically exit menu after a selection has been made and begin operating.

Beep code	Mode
1 short beep	Pan/tilt on CH 5/6 (factory default)
2 short beep	Pan/tilt on CH 5/7
3 short beep	Pan/tilt on CH 5/8
4 short beep	Pan/tilt on CH 6/7
5 short beep	Pan/tilt on CH 6/8
6 short beep	Pan/tilt on CH 7/8
1 long beep	Adjust servo center point*
1 short beep	Reverses pan servo direction
2 short beep	Reverses tilt servo direction
3 short beep	Auto correction passive (correct only within 20 degrees of center)
4 short beep	Auto correction in normal mode (default, recommended)
2 long beep	No selection made, automatically exits menu

Turnigy 9X Radio Setup.

Note: requires PS/2 to 3.5mm data cable accessory

- Connect battery to headset (make sure data cable is disconnected from radio before powering or it will not initiate properly)
- Connect Data cable and turn on radio.
- Enter TRAINER submenu and setup as below screen shot (shown for head tracker on default channels 5 and 6). Note GEAR (CH 5) and PIT (CH6) are set to NOR
- Optional (for interest only): Exit and enter DISPLAY submenu to see graphic output of head tracker servo signal.
- Plug pan and tilt servos into appropriate channel of RC receiver.



* **Adjusting the servo center point:** Due to the design of servos, the native center point may vary from servo to servo. The Turnigy 9X cannot compensate so the center offset must be adjusted in HT menu as follows:

- Set pan tilt brackets onto servo spur as close to center as possible.
- Enter HT menu (described above)
- On 1 long beep, press HT button
- Head tracker will now be active and can control pan tilt. Aim camera in desired center position and re-press HT button.
- Headset will beep 2X to confirm adjusted center offset
- Disconnect battery and restart before using.

Note: center offset is limited to +/- 20 degrees (thus the necessity to setup servos as close to center as possible before adjusting). If there is no 2X beep after confirming offset, the offset adjust was unsuccessful.

Futaba Radio setup.

Requires Futaba data cable (not included) see accessories

Note: Head tracker only works with higher end Futaba radios that support selective student channel mixing. Connect Data cable and turn on radio.

- Enter TRAINER menu and assign desired head tracking channels to FUNC (must be set on FUNC). Default is CH 5//6.
- Individual servo direction can be set in REVERSE menu (reverse not available for 7C users, must reverse direction in HT menu).

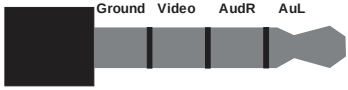
Head Tracker Operation

- Head tracker will automatically start tracking upon powering up headset. - Look forward and level then press the Head Tracker button to center (note, on 1st press HT may drift off momentarily during calibration cycle, hold head steady until camera returns to center).
- Repressing the HT button during use re-centers the camera position.
- External interference (from RC controller, other devices, indoors or next to a car) may temporarily cause errant readings in the magnetic sensor and cause drift. If error between camera and direction your head occurs, hold your head steady in one position and head tracker will autocorrect to that position. After auto correction, continue to use normally. For best performance, use HT away from objects/products that may disrupt the magnetic field

Head Tracker Center Hold Function

To pause and hold head tracker in center position; hold down the HT button for 2 seconds (2 seconds to pause – single beep, 2 seconds to reactivate – double beep).
Auto disengage function: M.I.G. V4 has a unique safety feature added: the head tracker will automatically disengage (enter pause mode) and return camera to center position if the head tracker exceeds 90 degrees of movement (90 degrees is beyond normal use). This allows the user to quickly deactivate the head tracker in a panic situation (turn head 90 degrees). Also useful for when removing the headset as the motion will disengage the HT

AV in/out Port



RCA Connector: Yellow: Video, White: Audio Left, Red: Audio Right

Recording Video

Connect AV cable to AV out port on right side of headset. Connect recording device to cables and set up as per manufacturer directions.
Note: Cables pins are not all the same (see above chart), be sure to connect to headset using the included cable.

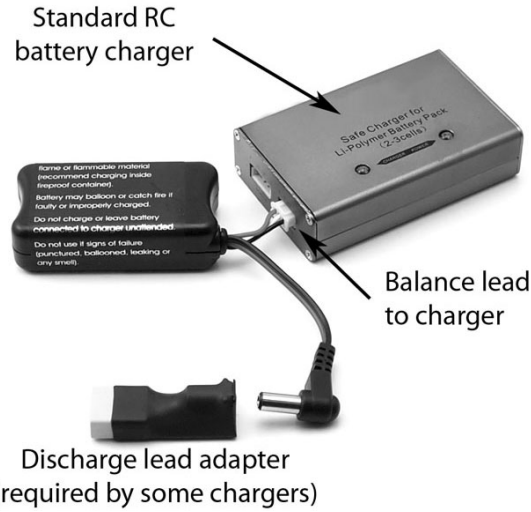
Using an external receiver:

Use the AV cable to connect headset to the RCA AV port of external devices.
To share the base station power supply with your goggles, pick up a 3m Dominator AV cable accessory from your retailer. Note; internal receiver must be shut off to properly display external AV.

Battery Charging

The 1000 mAh 7.4V lithium polymer battery pack is equipped with a 3 pole balance charger lead that allows the battery to be charged off standard RC battery pack chargers (not included). Follow your charger instructions for setting up for 1000 mAh 7.4V Li-po.

Note: some chargers require the discharge cable to be connected. Use the enclosed discharge lead adapter for these types of chargers.



Note: If the charger fails to announce charge complete, but is showing battery voltage at 8.4V, the charge can be considered finished

DO NOT LEAVE BATTERY ATTACHED TO CHARGER WHEN CHARGER IS NOT PLUGGED IN.

Accessories

Futaba Data Cable

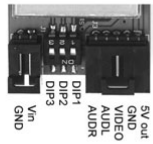
This 1m data cable allows you to connect to Futaba radios and simultaneously power the headset off the RC controller battery. Head tracker is compatable with Futaba 7 series radios and above (must support selective channel mixing - consult your manual)

100mW 5G8 Transmitter

Get up to 500m range with the cool running switch regulated 100mW transmitter. It is designed to be plug/play with Fat Shark cameras. For best performance we recommend the ImmersionRC 600mW transmitter.

7 Channel 3o DIP switch

DIP 3	DIP 2	DIP 1		
0	0	0	CH1	5740MHz
0	0	1	CH2	5760MHz
0	1	0	CH3	5780MHz
0	1	1	CH4	5800MHz
1	0	0	CH5	5820MHz
1	0	1	CH6	5840MHz
1	1	0	CH7	5860MHz



AV in: Connect to 5p camera Molex connector

Power out: 5V Power output as shown on TX label to power camera

Voltage in: 6-12V

CAUTION: IF TX DOES NOT HAVE ADEQUATE VENTALATION. THE TX MAY AUTO SHUTOFF IF OVERHEAT

Pan Tilt Camera

Maximize the immersion experience by adding a pan/tilt camera to your FPV system. Camera servos plug into spare channel of your RC receiver and are controlled by the M.I.G. head tracker inside your Predator goggle. Camera is plug/play with Fat Shark and ImmersionRC transmitters.

Diopter lens

For near sighted users, diopter lens insert sets are available that include -2, -4 and -6 dpt. See below insert instructions. Lens orientation is not critical.

Specifications

Optics:

- FOV 25 degrees diagonal
- Interpupillary (IPD) distance: 63.5mm (fixed)
- Optional diopter lens inserts available in -2, -4, -6 dpt

Audio:

- Stereo

User Controls:

- Channel selection
- Contrast/brightness
- Volume adjustment
- Head tracker reset/menu control

Electrical:

- Power supply, 7-13V (2S/3S supply)
- Power consumption: 200/350mA (direct/wireless)

Battery:

- 7.4V 1000mAh lithium polymer with safety circuit.

System:

- NTSC/PAL auto select
- Interlaced only (not progressive scan)

Mechanical:

- Ergonomic molded shape.
- Rubber eye cups for ambient light reduction.
- Weight: 163g
- Adjustable headband

Display

- Two full color micro VGA LCD's (640 X 480 lines)
- Resolution 922,000 pixels per eye

Head Tracker

- Magnetic, Inertial and gyro

Receiver

- 5.8Ghz 7ch

Interface

- 3.5mm 4p AV in/out port
- Power in port
- 3.5mm 3p Earphone port
- PS/2 head tracker port

Operational advice

- **For best performance**, select a channel that has the least amount of interference. While the transmitter is turned OFF, turn on the video headset and look at the screen as you check each channel. Clear channels will have a consistent static background. Channels with interference will have horizontal static lines.
- **Always perform a range test before flying**. This includes AV and RC controls. Some RC receivers can be affected by the proximity of other electronic devices particularly the AV TX.
- Try to space out your components as much as possible to avoid interference to your RC control range (keep stuff away from RX)
- Until experienced, practice flying in a familiar area to avoid becoming disorientated.
- Due to antenna characteristics, there is a "null" in line with antenna direction. You may experience excessive video breakup when flying overhead
- 5.8Ghz signal strength drops off very fast, stay safely within solid AV range.
- **For maximum distance** it is very important that a clear line of sight exists between the transmitter and the video headset. 2 of the worst causes of interference are human bodies and reinforced concrete.
- Place your TX antenna in open area in a vertical orientation
- **Multipathing** (reflections off buildings/ tall objects) causes signal cancellation and result in broken video. Fly in open areas away from buildings or other tall structures (i.e. barns, hills).
- **5.8Ghz AV with 2.4Ghz RC controllers:** 2.4Ghz may cause harmonic interference on Ch2 – Ch7 of the 5.8Ghz AV (Ch1 not affected). The headset has been equipped with a high pass filter that will allow the system to work with CE certified 2.4Ghz RC controllers. However, the filtering may be insufficient to remove noise from overpowered non CE certified controllers.
  If you experience interference from your RC radio, change the AV channel to channel 1.
- Although you don't require any license to operate this device, you are still legally responsible for operating in a responsible manner.

Trouble shooting

Observation	Possible cause/solution
No image, display is completely dark	- No power supplied. Check power connections.
No image, display is glowing dark grey	- If using wireless module, turn on RX power on bottom of headset. - If using AV in cable, check video source. - Ensure TX is on and camera connections solid
Lots of interference lines (horizontal lines)	- Choose a cleaner channel.
Lots of interference lines (horizontal lines) when using 5.8Ghz receiver	Check to see if cause is harmonic interference from 2.4Ghz RC controller (turn radio on/off). - Use CH1 on TX/headset (Ch1 not affected by 2.4Ghz) - check correct frequency antenna is used
Washed out image, short range.	Wiggle SMA to see if improves RX module connection
Head tracker not working	- Ensure headset is turned on before RC radio - Review controller manual for correct settings - Check servos are plugged into correspondingly selected channels
Head tracker not working, no beeps	- Cable was modified and resulted in voltage applied to signal line (fried HT) - Mated to an aftermarket channel mixer and wired wrong resulting in voltage applied to signal line - Incorrect installation of aftermarket UHF RC system resulting in voltage applied to signal line - Unit dropped during shipping and HT module disengaged from socket (open and reseat).
Short range	- Ensure 5.8Ghz antenna was installed - Check for other sources of interference - Ensure transmitter has clear LOS to headset. Test in wide open area, away from any obstructions
Short range (con't)	- Ensure that a compatible antenna is installed. Do not use other manufacture antenna, they may be dual band or may be reverse SMA (no center pin to connect to receiver)
White dots on LCD display	You were careless and left goggles exposed to sun. Sun burnt off LCD color filter.

Warranty

The system can be exchanged for a new unit within 30 days for any manufacturing defects if returned in new condition. The video headset will be warranted for repair for 2 years if no signs of excessive use. Buyer will be responsible for shipping costs. If beyond the warranty period we will provide repair services.